

Challenges to Implementing Food Safety and Produce Handling Training in School Meal Programs

Sandra C. Curwood, PhD, RDN (Corresponding author)

School Nutrition Programs Director, Virginia Department of Education

101 North 14th Street, Richmond, VA 23219, United States

Tel: 1-804-371-2339 E-mail: sandra.curwood@doe.virginia.gov

Susan W. Arendt, PhD, RD, FAND

Professor in Hospitality Management

Associate Chair for Undergraduate Academic Affairs, Iowa State University

9E MacKay Hall, 2302 Osborn Drive, Ames, Iowa 50011, United States

Tel: 1- 515-294-7575 E-mail: sarendt@iastate.edu

Lakshman Rajagopal, PhD

Associate Professor in Hospitality Management, Iowa State University

31 MacKay Hall, 2302 Osborn Drive, Ames, Iowa 50011, United States

Tel: 1- 515-294-9740 E-mail: lraj@iastate.edu

Stephen W. Sapp, PhD

Professor in Sociology, Iowa State University

320 East Hall, 510 Farm House Lane, Ames, Iowa, 50011, United States

Tel: 1-515-294-1403 E-mail: ssapp@iastate.edu

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Abstract

This study explored school foodservice directors' (FSDs') attitudes, influencers, knowledge about safe produce handling, and perceived challenges related to food safety training using Ajzen's (1985) theory of planned behavior (TPB) as a theoretical underpinning. A web-based questionnaire was developed, pilot tested, and sent to all 864 public school districts in California. Demographic data, knowledge scores, attitudes, influencers, and challenges are reported using descriptive statistics and t-tests. Most respondent school FSDs (n=136, response rate of 16.4%) were female, between the ages of 35-64, with a least a bachelors' degree, and more than 10 years of school foodservice experience. Most districts were self-operated, small, at least 50% free and reduced eligibility, and had conventional kitchens with speed-scratch preparation. School FSDs' attitude towards offering food safety training had the highest level of agreement regarding maintaining department reputation. The health inspector was identified as having the greatest likelihood to think food safety training should be offered. The noted perceived challenge to providing food safety training was "employee scheduling availability." Findings identified 84.4% (n= 108) of respondents had a Certified Food Safety Protection (CFPM) certification and 12.6% (n= 16) attended USDA's Produce Safety University (PSU) with no significant differences in knowledge scores based on either having attended USDA's PSU or having CFPM certification. Regarding knowledge questions, 24.4% answered all six correctly (n= 125-127). School foodservice staff need adequate food safety training and safe produce handling practices as part of their food safety management plan. Produce safety training can be supported by state agencies and professional organizations.

Keywords: Food safety, Produce handling, Professional development, School foodservice, Theory of planned behavior, Training

1. Introduction

School foodservice directors have a responsibility to uphold and promote food safety in school nutrition programs to maintain student health and well-being. According to United States Federal Drug Administration Food Code, school-aged children are susceptible to foodborne illnesses and require additional safeguards (U.S. Food and Drug Administration [FDA], 2014).

The Child Nutrition and WIC Reauthorization Act of 2004 required school nutrition programs to implement food safety programs based on hazard analysis and critical control points (HACCP) principles (United States Department of Agriculture, Food and Nutrition Services, 2004) USDA, FNS, 2004). Two health inspections are required annually for each school (USDA, FNS, 2014). Specifically, the need to address produce safety in school nutrition programs has been identified by USDA through programs, such as Produce Safety University (USDA, FNS, 2013) and Serving Up Science: The Path to Safe Food in Schools (Serving Up Science, 2015).

Preventing foodborne illness is integral to food safety management. Using data from the U.S. Foodborne Disease Outbreak Surveillance System, Gould, Walsh, Vieira, Herman, Williams, Hall, and Cole (2013) identified the number of foodborne illness outbreaks in schools as 286;

representing 17,266 illnesses from 1998 to 2008. While the number of outbreaks was far less in schools than in restaurants (7,939) or private homes (1,058), the median number of illnesses per incident (38 in schools, compared to 5 in restaurants) was much greater. This emphasizes the importance of minimizing foodborne illness risk in schools. The CDC (2015) reported that most cases of foodborne illness go unreported or even undiagnosed.

Training is relevant in produce safety, as foodservice professionals are central to foodborne illness prevention. Foodservice professionals, including directors, managers, and employees require training to acquire job knowledge to perform their duties. Acquiring job knowledge and applying it in to practice supports organizational objectives, specifically in school foodservice; this includes maintaining a safe food environment that protects student well-being. Jones, Punia, Young, Huegli, and Zidenberg-Cherr (2013) conducted a statewide training needs assessment in California with 54.7% (n= 422) respondent foodservice directors and supervisors identifying food safety training as being really needed or somewhat needed.

Professional standards for school nutrition programs became mandatory in July 2015 and include professional development requirements for all school foodservice staff (USDA, FNS, 2016). Specific standards include a minimum of six to twelve training hours depending on job category and cover four key topic areas with food safety and HACCP as training topics (USDA, FNS, 2016). All new school foodservice directors are now required to have eight hours of food safety training every five years (USDA, FNS, 2016).

The purpose of this study was to explore California school foodservice directors' attitudes, knowledge, beliefs, and identify challenges to providing food safety training related to produce handling in school foodservice programs. Ajzen's (1985) theory of planned behavior (TPB) was used as a theoretical underpinning for examining school foodservice directors' attitudes, influencers, challenges, and safe produce handling knowledge impact on food safety training. Attitudes in this study are based on personal judgement or experience as to whether an outcome will occur (Fishbein and Ajzen, 1980). Influencers rely on individuals' perceptions about the impact of others on their behavior, while challenges are related to their views of what resources are available to facilitate the behavior of food safety training (Ajzen, 2006).

2. Methodology

2.1 Population

The population included all California school foodservice directors as identified using the California Department of Education database (California Department of Education, 2015). School district foodservice departments may not each have a position with the title of foodservice director; therefore, the sample included the staff person designated as responsible for oversight of the foodservice department. In the 2015/16 school year, 864 California public school districts had school foodservice programs (California Department of Education, 2016).

Because food safety and state department requirements/guidelines vary by jurisdiction, only one state, California, was selected. California also has a long growing season and large crop variety that yields ample fresh produce available for school nutrition programs to utilize.

2.2 Survey Instrument

A web-based questionnaire was used. The survey instrument consisted of four parts. Part one contained 14 operations demographic questions such as number and type of schools in the district. Part two contained 24 items related to attitudes (8 items), influence of others (8 items), and perceived challenges related to food safety training (8 items). Questions related to attitude and influences of others and were adapted from Roberts (2008) examining restaurant managers' behavioral intention regarding food safety training. Slight modifications were made by adding stakeholders specific to school district settings. DeVellis (2012) notes that Likert-type scales are used in studies measuring beliefs and attitudes and therefore, a Likert-type response scale was used. Part three included food safety knowledge (6 questions). Six multiple choice questions were used to assess school foodservice directors' knowledge about produce safety and Good Agricultural Practices (GAP) and Good Handling Practices (GHP). The question development process for this part was derived from food safety training materials (Institute of Child Nutrition, 2015), from the California Food Code 2015 (California Department of Public Health, 2015) and from USDA's GAP and (GHP materials (USDA, AMS, 2016). The items were scored as either correct or incorrect, with a total of zero to six points possible. Part four comprised 10 foodservice director demographic questions including attendance at USDA's PSU as well as certification as a food safety protection manager (CFPM). Dillman, Smyth, and Christian (2009) suggested placing more personal questions at the end of a survey and so these questions appeared last. Not all data collected are reported in this manuscript, as it is part of a larger study. Institutional Review Board approval was received prior to data collection.

2.3 Data Collection

To address questionnaire content validity and clarity, a pilot test was conducted with a convenience sample of ten school foodservice directors outside the state of California. In order to prevent cannibalization of the California school foodservice directors sample pool, another state in the USDA western region, Washington, was subsequently used for the pilot study. The questionnaire was modified based on respondent feedback; for example, in the introduction, a "don't know" response option was added encourage participants to continue completing the questionnaire if they did not know or have access to the information requested, potentially leading to an increased number of respondents completing the questionnaire. The questionnaire was emailed to all California school foodservice directors (n=864).

2.3.1 Data Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 22 software. Descriptive statistics were utilized to analyze data distribution and included frequencies, means, and standard deviations for operational and foodservice director demographics. T-tests were utilized to analyze differences in mean scores between knowledge scores as well as operational and foodservice demographics.

Reliability for scales relating to the TPB was measured using Cronbach's alpha for internal consistency and was found to be: attitude towards food safety 0.92, influencers of food safety

training 0.91, and challenges 0.88. The desired threshold is 0.70 (Nunnally & Bernstein, 1994) which was met.

Internal consistency reliability for knowledge questions was measured using Kuder-Richardson 20 test with a value of 0.827 (with a range between 0 and 1). The reliability score was considered acceptable. The value indicates discernment between those who know the material versus those who do not. However, if the value was over 0.90, Kuder and Richardson (1937) indicated the test would not demonstrate any difference in knowledge, as if the same question was being asked in this example, six times.

3. Results and Discussion

3.1 School Foodservice Director Demographics

The web-based questionnaire yielded usable response rate of 16.4% (n= 136). Table 1 contains respondent demographic characteristics. Close to half (45.6%) of respondents were over the age of 50, and 84.4% were female, with 60.9% of respondents holding a bachelor's degree or higher. A foodservice director title was held by 92.7%. The majority of respondents (85.2%) had worked in school foodservice for over three years with 61.4% having been in their current position more than three years. Findings identified 84.4% (n= 108) of respondents had a CFPM certification and 12.6% (n= 16) had attended USDA's Produce Safety University.

Table 1. Questionnaire respondent's demographics (n=124-137)

Category	Frequency (n)	Percent (%)
Age		
18-25 years old	2	1.6
26-34 years old	18	14.2
35-49 years old	49	38.6
50-64 years old	56	44.0
65 years old or older	2	1.6
Gender		
Female	108	84.4
Male	20	15.6
Highest Level of Education		
High school	10	7.8
Some college	40	31.3
Bachelor's degree	51	39.8
Graduate degree	27	21.1
Job Title		
Foodservice Director	127	92.7
Other	10	7.3
Years Worked in School Foodservice		
0 to 3	19	14.8
4 to 6	23	18.0

7 to 10	14	10.9
More than 10	72	56.3
Years in current position		
0 to 3	49	38.6
4 to 6	23	18.1
7 to 10	18	14.2
More than 10	37	29.1
Certified Food Protection Manager ^a	108	84.4
Attended USDA's Produce Safety University ^a	16	12.6

Note: ^a Yes responses.

3.2 School District Demographics

Table 2 displays school district and departmental operational demographics. The number of schools per district ranged from one to 230, with over half (58.6%) having less than 10 schools. The highest percent of districts (92.0%) included elementary schools, 82.5% had middle schools, and 62% had high schools. School district enrollment size categories were determined from the USDA, FNS professional guidelines. USDA mandated professional development standards are based on these three school district size levels (USDA, FNS, 2016). District enrollment ranges were fairly equally distributed between the three categories, with 39.0% having 2,499 students or less, 29.4% of districts with 2,500-9,999 students and 31.6% having 10,000 or more students.

3.3 Department Operational Demographics

Department operational demographics are displayed in Table 2. Most (89.9%) school district foodservice departments were self-operated while only 10.1% were under contract management. Respondents were asked to indicate the types of kitchens in their departments as well as their methods of preparation. More than one selection was an option. Conventional onsite production was prevalent with 76.6% of respondents indicating they used this method. Additionally, 36.5% had satellite sites, 33.6% used a base kitchen with both onsite and distribution to site, 13.1% had central production with no onsite, 16.1% had a combination of types of kitchen production, and only 7.3% used a centralized commissary. The greatest number of respondents (62.8%) indicated using the speed-scratch method of preparation, while 30.7% used mostly the pre-prepared method, 8% used all-pre-prepared, 29.2% used assembly serve and the remaining 34.3% indicated they used a combination or another method of food preparation.

The greatest number of respondents (62.2%) served 500 or fewer breakfast meals daily with only 9.0% serving more than 3,000 per day. Just over half of the districts (51.2%) surveyed served more than 1,000 lunch meals. Less than half (47.2%) served between 301-3,000 snacks daily and two-thirds (67.7%) of respondents served 350 or less supper meals.

Table 2. District and department operational characteristics (n=118-137)

Category	Frequency (<i>n</i>)	Percent (%)
Number of Schools in District		
1-9	78	58.6
10-29	43	32.3
30-59	7	5.3
60-89	4	3.0
90 +	1	0.8
Types of Schools in District ^a		
Elementary	126	92.0
Middle	113	82.5
High	85	62.0
School District Enrollment		
2,499 or fewer	53	39.0
2,500-9,999	40	29.4
10,000 or more	43	31.6
Students Eligible for Free or Reduced Price Meals		
0-24%	19	13.9
25-49%	23	16.8
50-74%	51	37.2
75-100%	44	32.1
Management Type		
Self-operated	115	89.9
Contract	12	10.1
Types of Kitchens ^b		
Conventional Onsite	105	76.6
Centralized (commissary)	10	7.3
Base Kitchen (onsite preparation and distribution)	46	33.6
Central Production (no onsite service)	18	13.1
Satellite Sites	50	36.5
Combination	22	16.1
Type of Preparation ^b		
Speed Scratch	86	62.8
Mostly pre-prepared	42	30.7
All pre-prepared	11	8.0
Assembly-Serve	40	29.2
Combination and Other	47	34.3
Daily Average Number of Breakfasts Served		
500 or less	69	62.2
501-3,000	32	28.8
3,001-12,000	7	6.3
12,001 or more	3	2.7
Daily Average Number of Lunches Served		

1,000 or less	37	29.6
1,001-10,000	64	51.2
10,001-50,000	18	14.4
50,001- 100,000	6	4.8
100,001 or more	11	8.9
Daily Average Number of Snacks Served		
300 or less	34	27.6
301-3,000	58	47.2
3,001-10,000	20	16.3
10,001 or more	11	8.9
Daily Average Number of Suppers Served		
350 or less	67	67.7
351 -2,000	21	21.2
2,001-10,000	7	7.1
10,001 or more	4	4.0

Note: ^a Some school district have all three school types.

^b Greater than 100% due to multiple options possible.

3.4 Attitudes towards Food Safety Training

Survey questions addressed foodservice directors' attitudes towards food safety training including benefits, influences, and perceived challenges. Attitude was assessed using foodservice directors' beliefs as to why food safety training should be offered, including department reputation and management responsibility. Respondent school foodservice directors' attitude towards offering their staff food safety training found statements with highest level of agreement regarding maintaining department reputation included "increasing employees' awareness of food safety" (M= 6.59, on a seven point Likert –type scale, with 1 being extremely unlikely and 7 being extremely likely, SD= 0.97) and "ensure safe food" (M= 6.56, SD= 0.97), while the lowest levels of agreement were related to management responsibility for "reduce food cost" (M= 5.39, SD= 1.75), and "keeping my supervisor happy" (M= 5.69, SD= 1.67).

3.4.1 Influencers

Influencers, benefits, and challenges to providing food safety training are listed in Table 3. Respondents were asked about the impact that other individuals as stakeholders (important to their work) had in influencing their attitude towards food safety training. The health inspector (M= 6.59, SD= 1.18) and immediate supervisor (M= 6.25, SD= 1.36) were the individuals identified by school foodservice director's as having the greatest likelihood to think that food safety training should be offered. Two health inspections are required annually for each school (USDA, 2014) and are conducted by inspectors from the local public health departments. The Food and Drug Administration's Food Code is the source used by health inspecting agencies to develop their food safety guidelines (FDA, 2014). The health

inspections are unannounced and the results are made available to the public; major or repeat violations require corrective action, follow up visits, and potential facility closure and monetary penalties. Therefore, it is not surprising that foodservice directors ranked the health inspector highest in offering food safety training based on their potential influence on maintaining the departments' reputation. Conversely, vendors (M= 5.27, SD= 1.69) and short-term employees (employed less than two-years) (M= 5.68, SD= 1.46) were identified as least likely.

3.4.2 Challenges to Providing Food Safety Training

Survey results indicated that the challenge to provide food safety training with highest level of agreement was "employee scheduling availability" (M= 5.34, SD= 1.76) and "time commitment for training" (M= 5.08, SD= 1.82). The lowest level of agreement was "employees don't practice what they learn from training" (M= 3.50, SD= 1.93) and "lack of targeted materials" (M= 3.69, SD= 1.97). These findings suggest that the perceived challenges identified by school foodservice directors' are more likely related to scheduling and time available for training rather than employees' response to training or lack of targeted materials.

Table 3. Influencers, benefits and challenges to food safety training (n= 133-137)

	M ^a	SD
a. Likelihood the listed individuals will think that you should offer food safety training to your employees.		
Health inspector	6.59	1.18
Immediate supervisor	6.25	1.36
District superintendent	6.20	1.25
Customers (students, parents, faculty)	6.15	1.18
Board of Education	6.07	1.36
Long-term employees	5.87	1.47
Short-term employees (less than 2 years)	5.68	1.46
Vendor(s)	5.27	1.69
Total Influence of others	6.01	1.37
b. Food safety training will...		
Increase employees' awareness of food safety	6.59	0.97
Ensure safe food	6.56	0.97
Help maintain the department reputation	6.49	1.06
Decrease the likelihood of lawsuits	6.27	1.20
Keep customers satisfied	5.92	1.50
Increase employee satisfaction	5.82	1.37
Keep supervisor satisfied	5.69	1.67
Reduce food cost	5.39	1.75
Overall Benefit Mean Score	6.09	1.37
c. Challenges to provide food safety training		

Employee scheduling availability	5.34	1.76
Time commitment for training	5.08	1.82
Managers' time	4.89	1.94
Financial resources	4.80	2.01
Lack of on-site opportunities	4.77	1.99
Lack of off-site opportunities	4.57	1.93
Lack of targeted materials	3.69	1.97
Employees don't practice what they learn from training	3.50	1.93
Overall Challenges Mean Score	4.58	1.93

^a Rating scale: 1= extremely unlikely to 7= extremely likely.

3.5 Produce Safety Knowledge

School foodservice director knowledge was tested by answering a series of six produce safety and GAP related questions. Findings revealed only 24.4% of responding foodservice directors answered all six questions correctly and 32.3% missed only one question (n= 125-127). The question most frequently missed was regarding fresh produce handling and storage (i.e. GHP) with just over half (57.9%) answering correctly. A question related to GAPs regarding receiving fresh produce were answered correctly by 59.2% and a question about acceptable delivery practices were answered correctly by 66.4%. Temperature control, serving, and cross-contamination questions were answered correctly, 79.2%, 99.2% and 100% respectively.

3.5.1 Foodservice Director Demographics and Produce Safety Knowledge

CFPM certification was held by 84.4% (n= 108) of respondent FSDs with 12.6% (n= 16) having attended USDA's Produce Safety University. Having attended PSU (n= 16) was associated with a mean produce safety knowledge score of 5.00 (SD= 0.89) in comparison with FSDs not having attended PSU resulting in a mean produce safety knowledge score of 4.64 (SD= 0.99). An independent samples *t*-test was performed, revealing no significant differences in knowledge scores of respondents based on either having attended USDA's Produce Safety University (PSU) (p= .095) or having certification as a Food Protection Manager (CFPM), which includes certifications such as ServSafe® and the National Registry of Food Safety Professionals (p= .129). It should be noted that the limited number of respondents may impact results. Other FSD demographics including education level, age, sex, and years in school foodservice did not yield any statistically significant difference in mean knowledge scores. Table 4 contains mean produce safety knowledge scores compared to characteristics respondents, school districts, and foodservice department operations.

3.5.2 School District and Department Characteristics and Produce Safety Knowledge

Foodservice directors in school districts with greater than 2,499 students were noted to have significantly (p ≤ 0.00) higher mean knowledge scores (M= 4.92, SD= 0.96) than their counterparts with fewer students (M= 4.27, SD= 0.92). Respondents identifying their district foodservice as self-operated (n= 115) had a significantly (p= .025) higher mean food safety knowledge score (M= 4.73, SD= 1.01) compared to districts (n= 12) contracting a management

company ($M= 4.25$, $SD= 0.62$). However, these results are based on a small sample size and therefore may not reflect the greater population. School FSDs in smaller districts (2,499 or less students) may have fewer resources available for training, while potentially maintaining the same number of areas of responsibility.

Table 4. Produce safety knowledge compared to respondent demographics and district and department operational characteristics and influence of others ($n= 118-137$)

Respondent Foodservice Director Demographics			
	N	Mean (M) Knowledge Scores ^a	SD
Foodservice Director Age (Years)			
Less than 50	19	4.68	1.01
50 or Older	106	4.63	0.90
Foodservice Director Education			
Less than a Bachelor's Degree	77	4.90	0.96
Bachelor's Degree or Higher	49	4.33	0.92
Years in School Foodservice			
Less than 7	41	4.65	0.94
7 or More	86	4.68	1.01
Sex			
Male	19	4.95	0.97
Female	107	4.63	0.99
Food Protection Manager Certification			
		Mean (M) Knowledge Scores ^a	SD
Yes	108	4.69	1.02
No	19	4.68	0.82
Produce Safety University Attendance			
Yes	16	5.00	0.89
No	111	4.64	0.99
District and Department Operational Characteristics			
Management Type			
Self-operated	115	4.73	1.01
Contract	12	4.25	0.62
Number of Students			
1-2,499	77	4.92	0.96
2,500 or more	48	4.27	0.92

^a Knowledge scores range 0 to 6.

4. Conclusions

Handling produce safely is important in school nutrition programs. School foodservice staff requires adequate food safety training to maintain a food safe operation, which includes safe produce handling, and is integral to their food safety management plan.

Foodservice professionals, including directors, managers, and employees, require training to acquire job knowledge to perform their duties. Acquiring job knowledge and applying it in practice supports organizational objectives. In the school district setting, organizational objectives include student well-being. Training in the workplace is imperative for staff at all levels and has been identified in the literature as essential to facilitate meeting organizational objectives (Bartel, 1991; Delaney & Huselid, 1996). Conversely, Poulston (2008) in a hospitality study noted that lack of adequate training was related to increased disciplinary problems and staff turnover. Knowledge acquisition can be acquired through training, but also occurs via observation of other employees, as well as with use of consultants and specialists. Previous studies with foodservice managers have noted that challenges to providing staff training include time, funding, and demographic differences (Arendt, Paez, & Strohbehn, 2013; Sneed & Strohbehn, 2008).

Most foodservice directors identified staff schedule availability and adequate time to train as perceived challenges to providing food safety training. While many resources and training materials were identified as being available for general food safety training, materials targeted to handling produce safely and GAP information may not be as well-known. The increased use of fresh produce and farm-to-school activities (USDA, FNS, 2016) demonstrates the increased need for availability of these resources in formats accessible and available to be delivered when time and scheduling are a challenge. Respondent school foodservice directors indicated recognition of the importance to other key stakeholders of food safety training. Communicating the importance of food safety training and safe produce handling to key stakeholders can be supported by State agencies and professional organizations.

While most school foodservice directors have a certified food protection manager certificate (84%), there is room for improvement. Produce safety knowledge testing indicated that there was no significant difference in food safety knowledge scores between directors with and without food safety certification. However, school foodservice directors are required to have food safety training and thus need this knowledge to operate a school nutrition program.

Recent programmatic changes have increased produce available in schools via the Healthy Hunger Free Kids Act of 2010 (USDA, FNS, 2014), which requires increased fruits and vegetables to be available in the National School Lunch Program (NSLP). In an Indiana study evaluating the methods and challenges in implementing the new NSLP regulations, methods noted by respondents to incorporate vegetables into the menu included 87.0% (n= 94) served as sides and 49.1% (n= 53) noted that they served vegetables in salad bars (Thiagarajah, Getty, Johnson, Case, & Herr, 2015). The proliferation of salad bars in schools and increased participation of school districts in Farm to School (F2S) programs coincides with produce safety concerns and the recent associated foodborne illness rates. This increased use of fresh produce in schools has also increased the need for GAP/GHP awareness by school foodservice

directors. FSD knowledge scores suggest that practice may have outpaced training and resources related to produce safety.

4.1 Professional Development Needs

Arendt, Paez, and Strohbehn (2013) noted that foodservice managers perceive staff turnover and limited time as barriers to making sure that staff adheres to established food safety practices. Sneed and Strohbehn (2008) noted as a trend that generational and ethnic diversity in foodservice creates a need for the manager to customize food safety training and is facilitated by online and technology resources. Strohbehn, Jun, and Arendt (2014) found that 98.2% (n= 754) of school foodservice employee study participants had received some food safety training and concluded that tailoring the delivery method based on employee age group and number of hours worked could improve food safety practices. Technology continues to advance at a rapid rate and can support food safety training but also comes with an associated cost and an expected learning curve. Recognizing training strategies that apply to the needs of the adult learner can aid managers in improving training effectiveness. Strohbehn, Arendt, Ungku, and Meyer (2013) found that offering a variety of food safety training formats such as face-to-face delivery and computer based, could be used with adult learners. The authors noted that food safety tool kits used in a variety of delivery formats could be effectively used by foodservice managers.

4.2 Food Safety Training

According to the Centers for Disease Control and Prevention (2014), the three most common food safety errors contributing to unsafe food and foodborne illness are food handling errors, poor personal hygiene, and cross-contamination. Painter, Hoekstra, Tauxe, Braden, Angulo, and Griffin (2013) found that of the 17 food commodity categories, produce had the highest percentage (46%) of attributed foodborne illness cases; further emphasizing the importance of food safety training and safe produce handling.

The research findings comparing the effectiveness of training with food safety practice compliance have been conflicting. As with this study, foodservice director's knowledge scores were essentially the same whether they had certification as a food safety protection manager (CFPM) or not. In one observational study conducted in 40 schools in Iowa concerning foodservice operations, Henroid and Sneed (2004) reported that there was no difference in food safety knowledge noted between staff having taken a food safety certification course (64.4%) and staff not completing a course (35.6%). However, food safety practice scores were higher for staff (managers and employees) that had completed a food safety certification course. The authors found no significant differences in food safety practice scores based on personal demographics of age, education, or experience nor were there differences based on operational demographics such as number of schools or amount and type of staff.

FSD knowledge mean scores were found to be higher in medium and larger school districts (with more than 2,499), possibly indicating that smaller districts have less training and fewer resources available. Additionally, self-operated districts had a higher knowledge mean scores

than the respondents with contract management; however the sample size was small and therefore may not be reflective of the population.

Professional standards for school nutrition programs became mandatory in July 2015 and include professional development requirements for all school foodservice staff (USDA, FNS, 2016). Specific standards include a minimum of six to twelve training hours depending on job category and cover four key topic areas with food safety and HACCP as one of six training topics (USDA, FNS, 2016). All school foodservice directors are now required to have eight hours of food safety training every five years (USDA, FNS, 2016). Produce Safety University, a five-day program sponsored by USDA that provides in-depth hands on training for school nutrition programs, has not been widely available. Expanding participation opportunities and providing material in formats easily delivered to site staff may provide the additional produce safety specific materials to enhance school food safety training plans. Additionally, GAP and GHP training topics can be incorporated into existing food safety training materials.

Foodservice directors' attitudes, influencers, challenges, and knowledge regarding produce safety may impact their provision of food safety training. FSDs had the highest agreement scores with the health department inspector and their immediate supervisor had significant ($p=0.02$) influence on their behavior. Therefore, maintaining the department's reputation was found to have the greatest influence on FSD's intention to offer food safety training.

The challenge facing school foodservice directors is in both maintaining food safety standards and safe produce handling required to support student well-being and managing the operational objectives both fiscally and from a human resources perspective. There are opportunities for state agencies and professional organizations to develop, provide a variety of training formats, and make these materials widely available to school foodservice directors.

4.3 Limitations

This study is not without constraints due to the small response rate. Recent programmatic changes may have possibly impacted FSDs workload and less focus for additional activities, such as participating in studies. Generalizations are therefore limited as the results from one state may not be representative across other states or regions.

4.4 Future Research

Future studies could expand the population to include other states and USDA regions and possibly compare regions nationally. Further expansion of the knowledge questions and separating basic produce handling from GAP/GHP questions might also yield more insight regarding foodservice director knowledge in these topic areas.

The purpose of this study is to explore school foodservice directors' intentions to procure farm-to-school produce based on food safety practices.

Definitions:

Alternative produce procurement: Purchasing practices within geographic boundaries include, but are not limited to, purchasing directly from a grower, from a farmers market, through community supported agriculture, or via a regional food hub (USDA-FNS, 2014).

Traditional produce procurement: Also termed “conventional” procurement, this is described as purchasing through a broadline or wholesale foodservice distributor.

Part I: Operational Demographic Information. Please answer the following questions based on your school foodservice operation.

Tell us about your district:

1. In which of the following farm-to-school regions is your district located?

North Coast: Del Norte, Humboldt, Mendocino, Lake, Napa, Sonoma, Marin

North Valley: Butte, Glenn, Tehama, Colusa

Sacramento Valley: Sacramento, Yolo, Solano, Placer

Mother Lode: Calaveras, Tuolumne, Amador, El Dorado

San Francisco Bay Area: San Francisco, San Mateo, Alameda, Contra Costa

Central Valley: San Joaquin, Stanislaus, Merced, Mariposa, Madera, Fresno, Kern, Tulare

Greater Los Angeles: Los Angeles, Riverside, San Bernardino

San Diego: San Diego, Orange

South Central Coast: San Luis Obispo, Santa Barbara, Ventura

2. How would you describe the setting of your school district?

Urban (population of more than 100,000 residents) **Suburban (20,000-100,000 residents)** **Rural (less than 20,000 residents)**

3. How many students are enrolled in your district?

2499 or fewer **2500-9,999** **10,000 or more**

4. How many total schools are in your district? _____

Does your school district include: (check all that apply) **Elementary school** **Middle School**

High School

5. Is your school foodservice department:

Self-operated Contract foodservice management

6. Please indicate the number of kitchen types in your district.

Conventional Onsite Kitchen (food prepared and served onsite)
 Centralized (Commissary)
 Base Kitchen (food served onsite as well as distributed offsite) _____
 Central Production Kitchen(no on-site service)
 Satellite Kitchen (foods prepared offsite and delivered for onsite service)
 Combination (Please describe)_____

7. How would you describe your preparation type? (Check all that apply)

"Speed-scratch" Mostly pre-prepared All pre-prepared
 Assembly-Serve Combination (Please describe): _____
 Other (Please describe): _____

8. What was the district-wide percentage of students eligible for free and reduced price meals on October 1, 2014 (CBEDS day)?

0-24% 25-49% 50-74% 75-100%

9. What was the average number of meals served daily in the 2014-15 school year?

Breakfast? _____ Lunch? _____ Snacks? _____ Supper?

10. What was your total food cost in the 2014-15 academic year? _____

11. What was your total fresh produce cost 2014-15? _____

12. What percentage of your produce costs were from conventional procurement in the 2014-15 academic year? 0% 25% 50% 75% 100%

13. What percentage of your produce costs were from farm-to-school (alternative) procured fresh produce in 2014-15? ___0% 25% ___50% ___75% _____100%

14. What was your annual labor cost for 2014-15? _____

Part II: Food safety training and produce procurement practices.

For each statement below, please indicate your level of agreement using the scale.

15. Offering food safety training to my employees will _____.

	Strongly Agree			Strongly Disagree			
A. keep my supervisor satisfied	1	2	3	4	5	6	7
B. keep my customers satisfied	1	2	3	4	5	6	7
C. ensure safe food	1	2	3	4	5	6	7
D. reduce food cost	1	2	3	4	5	6	7
E. increase employees' awareness of food safety	1	2	3	4	5	6	7
F. help maintain the department reputation	1	2	3	4	5	6	7
G. increase employee satisfaction	1	2	3	4	5	6	7
H. decrease the likelihood of lawsuits	1	2	3	4	5	6	7

16. Please indicate the likelihood the listed individuals will think that you should offer food safety training to your employees

	Extremely Likely			Extremely Unlikely			
A. Your immediate supervisor	1	2	3	4	5	6	7
B. Your long-term employees	1	2	3	4	5	6	7
C. Your short-term employees (less than 2 years)	1	2	3	4	5	6	7
D. Your customers (students, parents, faculty)	1	2	3	4	5	6	7

E. The health inspector	1	2	3	4	5	6	7
F. Your vendor(s)	1	2	3	4	5	6	7
G. Your board of education	1	2	3	4	5	6	7
H. District superintendent	1	2	3	4	5	6	7

17. Please indicate your level of agreement as to whether the listed item makes it difficult to provide food safety training

	Strongly Agree			Strongly Disagree			
A. Employee scheduling availability	1	2	3	4	5	6	7
B. Managers' time	1	2	3	4	5	6	7
C. Financial resources	1	2	3	4	5	6	7
D. Lack of off-site opportunities	1	2	3	4	5	6	7
E. Lack of on-site opportunities	1	2	3	4	5	6	7
F. Lack of targeted materials	1	2	3	4	5	6	7
G. Employees don't follow what they learn from training	1	2	3	4	5	6	7
H. Time commitment for training	1	2	3	4	5	6	7

18. Please indicate how STRONGLY you agree or disagree with the following statements

	Strongly Agree			Strongly Disagree			
A. Most people who are important to me think that I should purchase produce using alternative procurement methods.	1	2	3	4	5	6	7
B. The people in my professional life whose opinions I value would approve of me purchasing produce directly from farmers within the next	1	2	3	4	5	6	7

year.

C. Other school foodservice directors believe I should purchase produce using alternative procurement methods. 1 2 3 4 5 6 7

D. The California Department of Education supports purchasing produce from alternative procurement methods. 1 2 3 4 5 6 7

19. Please indicate how STRONGLY you agree or disagree with the statements.

	Strongly Agree							Strongly Disagree
A. Most California School Boards of Education believe alternative produce procurement methods should be used in school foodservice.	1	2	3	4	5	6	7	
B. Most California School chief business officials believe alternative produce procurement methods should be used in school foodservice.	1	2	3	4	5	6	7	
C. Most California school district superintendents believe it is important to purchase produce from alternative procurement sources.	1	2	3	4	5	6	7	
D. Most students believe it is important to purchase produce using alternative procurement sources.	1	2	3	4	5	6	7	
E. Most parents believe it is important to purchase produce from alternative procurement sources.	1	2	3	4	5	6	7	

20. Please indicate how STRONGLY you agree or disagree with the following statements.

	Strongly Agree							Strongly Disagree
A. It is my choice whether I purchase produce directly from farmers during the next year.	1	2	3	4	5	6	7	
B. I will try to purchase produce directly within the next year.	1	2	3	4	5	6	7	
C. I am able to purchase produce directly if I choose.	1	2	3	4	5	6	7	

D. I plan to purchase produce directly within the next year. 1 2 3 4 5 6 7

21. Please indicate how STRONGLY agree or disagree with the statements.

	Strongly Agree							Strongly Disagree
A. I am concerned about food safety associated with direct produce purchasing.	1	2	3	4	5	6	7	
B. I feel confident that I can manage food safety in alternative produce purchasing.	1	2	3	4	5	6	7	
C. I believe there is no difference in food safety between traditional and alternate produce purchasing.	1	2	3	4	5	6	7	
D. When compared to traditional produce purchasing, alternative purchasing has more safety concerns.	1	2	3	4	5	6	7	

22. For each statement below, please indicate how likely or unlikely you are to take action.

	Extremely Likely							Extremely Unlikely
A. I intend to use alternative produce purchasing in my operation during the next year.	1	2	3	4	5	6	7	
B. I want to increase my alternative produce purchasing in my operation during the next year.	1	2	3	4	5	6	7	
C. I do not expect to implement alternative produce purchasing in my operation during the next year.	1	2	3	4	5	6	7	
D. I believe there are adequate training materials and resources available for me to purchase produce using alternative procurement methods.	1	2	3	4	5	6	7	

Food Safety Knowledge (Based on the 2015 California Food Code and Good Agricultural Practices (GAP), please answer the questions below):

23. What food is NOT considered time /temperature controlled for safety (TCS)? (Select one)

- Frozen corn Pizza Whole tomatoes
 Chopped lettuce Chicken nuggets

24. Select the TRUE statement. Unprocessed produce should be delivered:

- in a new, single-use container.
 in a reused cardboard produce box
 in a plastic-lined sealed container.
 loose in the back of a pickup truck.

25. Which of following practice is correct in a foodservice operation?

- Store washed and unwashed fruits and vegetables together.
 Wash fresh tomatoes before storing.
 Handle ready-to-eat vegetables without gloves.
 Use packaged, washed, ready-to-eat spinach without rinsing.

26. A salad bar with eight different items on it, must have how many serving utensils?

- 2 4 6 8

27. What is the concern with storing raw chicken above romaine lettuce in the refrigerator?

- Cross-contamination Poor personal hygiene
 Time-temperature abuse Lettuce tastes like chicken

28. Which one of the following statements is FALSE: Unprocessed fresh produce should be rejected if:

- specifications are not met there is evidence of product abuse
 there is evidence of pests if the product temperature is over 41° F

Part III: Foodservice Director Demographic Information.**Tell us about yourself:**

29. What is your job title?

Foodservice Director Foodservice Manager
 Foodservice Supervisor Other: (list) _____

30. Which of the following job duties do you perform? (Check all that apply)

Menu planning Recipe development Budget management
 Staff hiring Staff training Staff supervision
 Staff evaluation Purchasing of foods Receiving of products
 Preparation of meals Inventory management Marketing of the program
 Other (please specify) _____

31. How many hours per week do you work in school foodservice?

Less than 10 hours 10 to 19 hours 20 to 29 hours
 30 to 40 hours More than 40 hours

32. How many years have you been in your current position?

Less than 1 year 1 to 3 years 4 to 6 years 7-10 years 10+ years

33. How many years have you worked in school foodservice?

1 year or less 1 to 3 years 4 to 6 years 7-10 years 10+ years

34. Which of the following best describes your highest education level?

Some high school High school diploma (or equivalent)
 Some college Bachelor's degree Graduate degree

35. What is your sex?

Male Female

36. What is your age?

18-25 years old 26-34 years old 35-49 years old
 50-64 years old 65 years old or older

37. Have you attended USDA Produce Safety University? YES NO

38. Are you a Certified Food Protection Manager (CFPM)? ? YES NO (for example:
Servsafe®, National Registry of Food Safety Professionals).

Thank you very much for sharing your time and information. Please provide any additional comments here: _____

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